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ATTACHMENT 2 [Dewatering Memorandum]

**Revised Final**

# Technical Memorandum

# Dewatering Requirements For the I-564 Intermodal Connector Project In The Camp Allen Area

**Naval Station Norfolk**

**Norfolk, Virginia**

*Prepared for*

## Department of the Navy
## Atlantic Division
## Naval Facilities Engineering Command
**Norfolk, Virginia**

**Under Contract No. N62470-95-D-6007**
CONTRACT TASK ORDER **0171**

*Prepared by*

CH2MHILL

Virginia Beach, Virginia

**June 2005**

Memor

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REVISED FINAL

# Technical Memorandum
# Dewatering Requirements for the I-564 Intermodal Connector Project in the Camp Allen Area

NAVAL STATION NORFOLK
NORFOLK, VIRGINIA

CONTRACT TASK ORDER 0117

*Prepared For:*

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
*Norfolk, Virginia*

*Under the:*

LANTDIV CLEAN Program
Contract N62470-95-D-6007

*Prepared By:*

CH2MHILL

Baker Environmental, Inc.

June 2005

# Contents

# Acronyms and Abbreviations

| | |
|---|---|
| bgs | below ground surface |
| BTX | Benzene-Toluene-Xylene |
| CAL | Camp Allen Landfill |
| CASY | Camp Allen Salvage Yard |
| CATP | Camp Allen Treatment Plant |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| COPC | Contaminants of Potential Concern |
| DPVE | Dual Phase Vapor Extraction |
| FFA | Federal Facilities Agreement |
| gpm | gallons per minute |
| HHRA | Human Health Risk Assessment |
| MCL | Maximum Contaminant Level |
| NPL | National Priorities List |
| OSHA | Occupational, Safety, and Health Administration |
| PAH | Polynuclear Aromatic Hydrocarbons |
| PCB | Polychlorinated Biphenyl |
| RCRA | Resource, Conservation, and Recovery Act |
| RI | Remedial Investigation |
| SARA | Superfund Amendments and Reauthorization Act |
| SVOC | Semivolatile Organic Compound |
| TEGD | Technical Enforcement Guidance |
| TCLP | Toxicity Characteristic Leachate Procedure |
| USEPA | United States Environmental Protection Agency |
| VDEQ | Virginia Department of Environmental Quality |
| VDOT | Virginia Department of Transportation |
| VOC | Volatile Organic Compound |

# 1 Introduction

The following document outlines the technical requirements for the Virginia Department of Transportation (VDOT) and associated subcontractors to conduct dewatering operations in the Camp Allen area of Naval Station Norfolk, Norfolk, Virginia, pursuant to VDOT's plan to construct the I-564 Intermodal Connector in an area just to the north of the CAL (see Figure 1). VDOT's planned dewatering from construction activities could potentially impact the groundwater plume for the CAL. However, the dewatering is not anticipated to reduce the overall effectiveness of hydraulic containment of the plume. The Camp Allen Treatment Plant (CATP) will be used to treat groundwater encountered during VDOT's on-site dewatering activities for utilities and roadway construction.

Under NAVSTA Norfolk's, Installation Restoration Program, the Camp Allen Treatment Plant (CATP) is a groundwater remediation system constructed as part of the final selected groundwater remedy at the CAL, which collects, treats, and discharges groundwater to a drainage ditch flowing to nearby Bousch Creek. The expanded use of the CATP from these activities will require modifications to the plant to address sediment loading and increased monitoring and modeling to assure continued capture of the Camp Allen Area (CAA) groundwater plume. The areas currently proposed by VDOT for dewatering include (1) Installation of communication equipment near manhole CA-58, (2) Utility installation associated with the relocation of Fleetrec Park, and (3) Fleetrec Park Construction. It is anticipated that additional dewatering will be required within the Camp Allen area.

VDOT is requesting the use of the CATP to treat groundwater drawn from the shallow aquifer for dewatering processes associated with the I-564 Intermodal Connector Project. Due to the potential infringement on institutional controls and the use of groundwater from the aquifer under the CAA, construction workers may have an increased risk of exposure to contaminated soils and groundwater. In addition, dewatering activities may breach current institutional controls for containing contaminated soils and groundwater, and could cause an increased potential for the migration of the contaminated groundwater plume beyond the Navy's property boundaries. VDOT has assumed responsibility for these eventualities and will be financially responsible for them and for any modifications to the CATP.

This goal of this document is to provide the technical requirements to VDOT and its subcontractors on the use of the CATP for dewatering operations in the Camp Allen area associated with the I-564 Intermodal Connector Project. This document shall:

- Provide a description of the Camp Allen Landfill and Camp Allen Salvage Yard and their historic uses.
- Identify the technical requirements for the dewatering operations including interface details, pretreatment requirements, environmental controls and CATP service limitations.
- Provide Navy point of contact information.

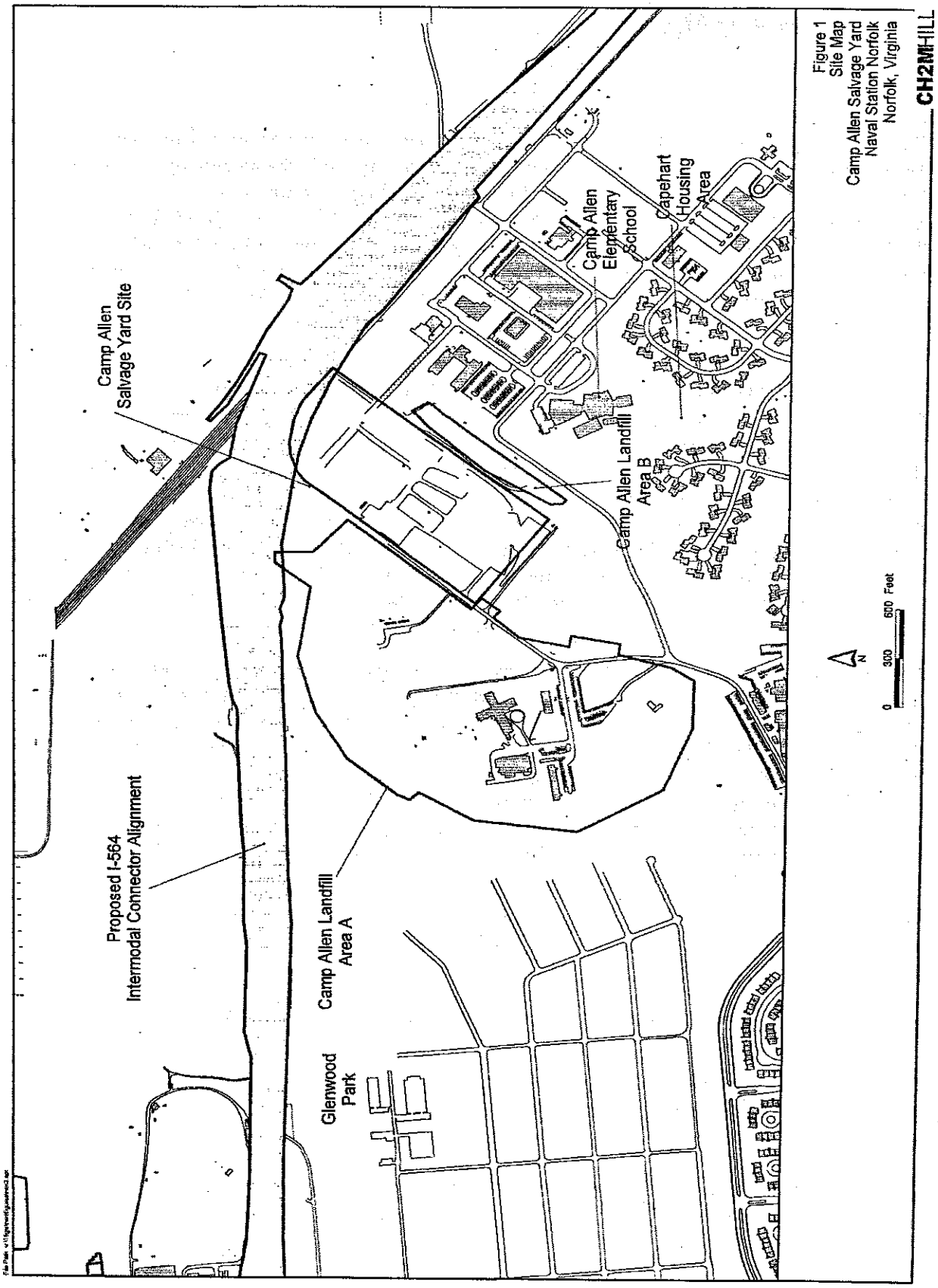


Figure 1
Site Map
Camp Allen Salvage Yard
Naval Station Norfolk
Norfolk, Virginia

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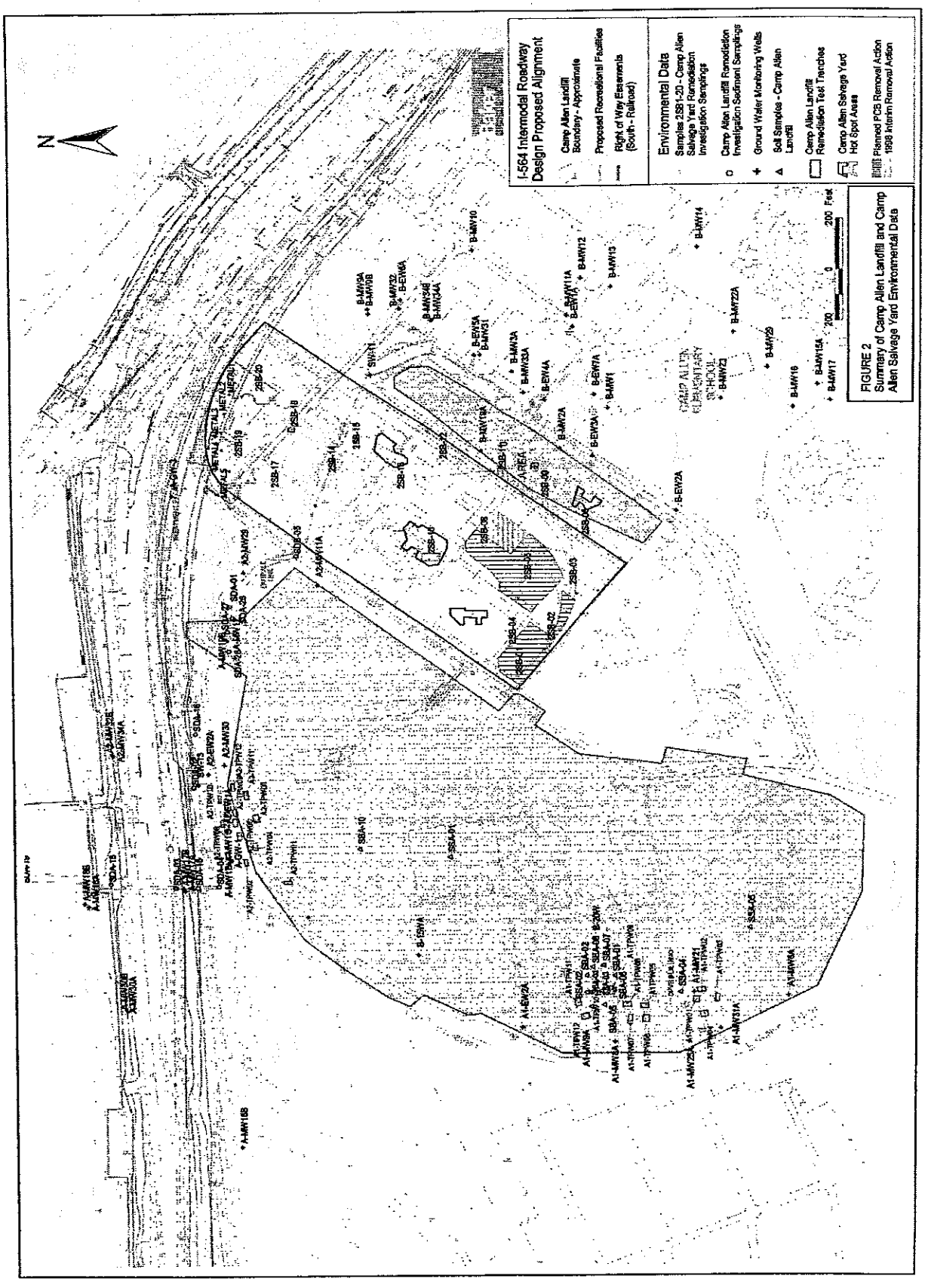
# 2 Site Description

The areas known as Camp Allen Landfill (CAL) and Camp Allen Salvage Yard (CASY) are located within the property boundary of the Naval Station Norfolk. They are located south of the Naval Station airfield and Interstate 564 in the area known as Camp Allen. CASY lies between Areas A and B of the CAL. Ingersol Street divides the sites. Figure 1 shows the CAL, CASY and surrounding areas. At present, the majority of the CAL is covered with soil and grass to minimize surface erosion. Area A incorporates the Navy Brig facility and a heliport built over a portion of the landfill during the mid-1970s. A residential area, Glenwood Park, is located to the west of the site, off of government property. At present the CASY is undergoing remediation and will be covered a one-foot vegetated soil cover.

As a result of past Navy operations, groundwater (both the shallow, Columbia aquifer, and the deep Yorktown aquifer) under the CAA is currently contaminated. The shallow aquifer groundwater may be encountered at a depth of three to eight feet below ground surface. The deep aquifer groundwater may be encountered at a depth of 23 to 50 feet below ground surface. Cleanup goals and the selected remedy were developed to address the contaminants of concern (COC) in both the Yorktown (deep) and the Columbia (shallow) groundwater aquifers at the CAL. COCs included the following volatile organic chemicals (VOCs) for both media of concern: 1,2-dicholoroethane, 1,2-dichloroethene (cis), 1,1,1-trichloroethane, benzene, ethylbenzene, tetrachloroethene, toluene, trichloroethene, vinyl chloride, and xylenes. Separate cleanup goals were established for both the deep and shallow groundwater. Total inorganic constituents detected in both aquifers in concentrations exceeding drinking water standards are believed to be associated with total suspended solids present in the wells and not representative of actual groundwater contamination. A detailed description of the environmental conditions for the CALF and the CASY are included in the documents referenced at the end of this document. Soil and groundwater sampling locations for which there is analytical data available are shown on Figure 2.

In 1997, the Navy started the operation of the Camp Allen Treatment Plant (CATP), a groundwater remediation system that collects, treats, and discharges groundwater to the drainage ditch that flows to Bousch Creek. The purpose of the CATP is to both contain the contaminated groundwater plume on government property, as well as to treat the contaminated groundwater to levels that meet Federal and/or State groundwater or surface water standards prior to discharge. Fifteen groundwater extraction wells collect groundwater in the vicinity of the CAA for treatment at CATP. Due to the elevated levels of naturally occurring metals with the groundwater, the CATP requires the removal of metals from the groundwater prior to discharge. The CATP is designed for an average flow of 150 gallons per minute (gpm), with design flows from Area A of 3 gpm for each of the two shallow wells, and 35 gpm for each of the three deep wells. The design flows for Area B of 3 gpm for each of the seven shallow wells, and 3 gpm for each of the four deep wells. Locations of the capture zones of the groundwater extraction wells for the shallow and deep wells are shown as Figures 3 and 4, respectively. In addition to the CATP, the CAL also has a Dual Phase Vapor Extraction (DPVE) system that is designed to address the localized VOC

contamination in the soil and groundwater, which is designed to operate at 30 gpm from extractions wells that are 25' deep.


I-564 Intermodal Roadway Design Proposed Alignment
Camp Allen Landfill Boundary - Approximate
Proposed Recreational Facilities
Right of Way Easements (South - Railroad)
Environmental Data
Samples 2881-20 - Camp Allen Salvage Yard Remediation Investigation Samplings
Camp Allen Landfill Remediation Investigation Sediment Samplings
Ground Water Monitoring Wells
Soil Samples - Camp Allen Landfill
Camp Allen Landfill Remediation Test Trenches
Camp Allen Salvage Yard Hot Spot Areas
1998 Interim Removal Action
FIGURE 2
Summary of Camp Allen Landfill and Camp Allen Salvage Yard Environmental Data
N
200 Feet
CAMP ALLEN ELEMENTARY SCHOOL
AREA 1
AREA 2
AREA 3

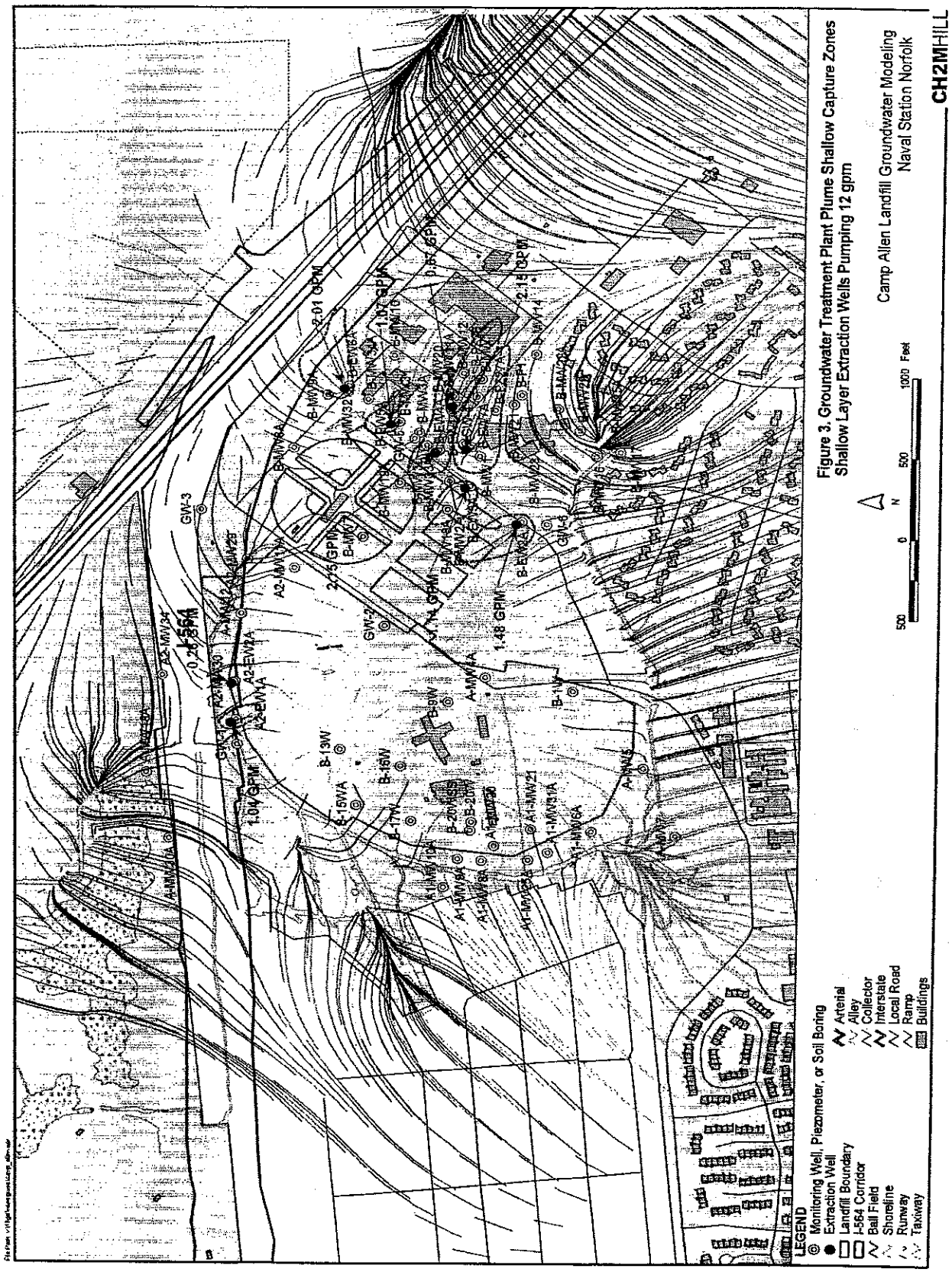



Figure 3. Groundwater Treatment Plant Plume Shallow Capture Zones
Shallow Layer Extraction Wells Pumping 12 gpm

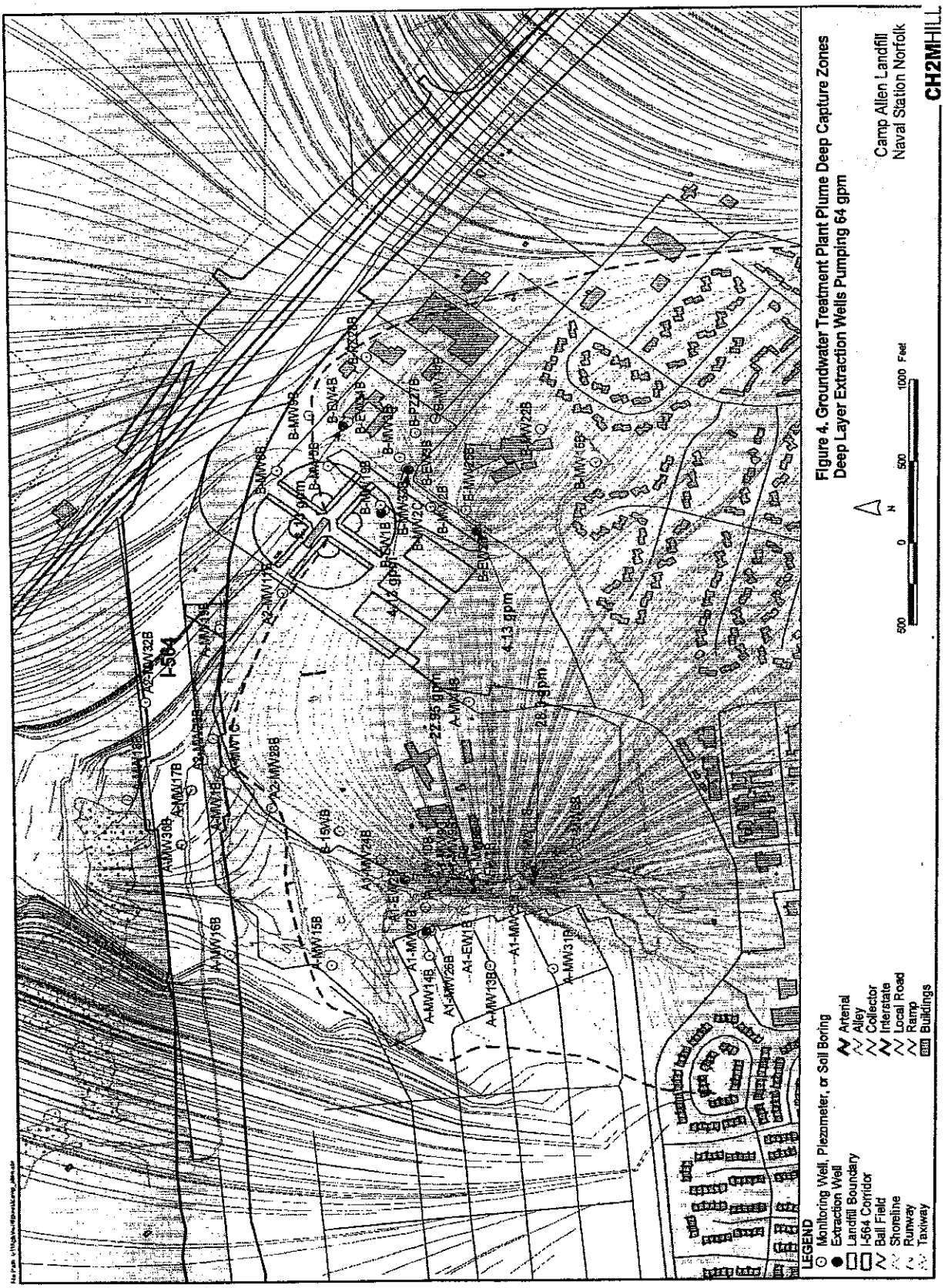



Figure 4. Groundwater Treatment Plant Plume Deep Capture Zones
Deep Layer Extraction Wells Pumping 64 gpm

# 3 Technical Requirements

## 3.1 Work Plans

Based on the nature and extent of contamination at the CAA, and because this area is being managed by the Navy as part of the IR Program for the Naval Station, subject to the requirements of a FFA, the Navy will require VDOT to provide detailed performance specifications or work plans describing the approach and methodology for managing contaminated groundwater during dewatering operations at the CAA. These plans shall be prepared in advance and incorporated into standard procedures related to dewatering, and all other practices not specifically outlined in this document. The work plan requirements are identified in Section 8.0 of the Technical Memorandum, Construction Restrictions For Navy Property and shall include at a minimum the following:

- **Health and Safety Plan**: VDOT shall develop a Health and Safety Plan in advance of any field activities that will be submitted to the Navy for review. The plan should describe safety precautions for each phase of the project as specifically related to dewatering. The plan should additionally identify safety equipment and procedures to be available and used during the project. It should also furnish the name and qualifications based on education, training, and work experience of the proposed field staff. Any dewatering operations shall be supervised by a person 29 CFR 1910.120 HAZWOPER certified as a site manager All site workers that come in contact with the groundwater shal l be 29 CFR 1910.120 HAZWOPER certified as a site worker.

- **Material Handling Plan**: A material handling plan should be prepared prior to initiation of the work that includes a detailed explanation of the phases dealing with all groundwater dewatering operations including the following: a schedule to be employed for the dewatering activities, a sequence of operation, the method of dewatering, proposed pre-treatment equipment to remove suspended sediments, and handling of the accumulated contaminated solids, testing requirements, and safety precautions and requirements. The plan should also show locations of proposed temporary storage structures and address the potential for permitting requirements.

- **Field Sampling and Laboratory Testing Plan for Soils and Groundwater**: The plan should describe field sampling methods and quality control procedures. Confirmatory sampling and testing of groundwater used to assess plume migration shall be performed by a qualified laboratory and should be explained in detail. The maximum analytical detection limits shall not exceed 1.0 ug/L for each of the site-specific contaminants summarized in Table 1.

**TABLE 1**
Summary of the Camp Allen Site Specific Contaminants

| |
|---|
| 1,2-Dichloroethane |
| cis-1,2-Dichloroethene |
| 1,1,1-Trichloroethane |
| Benzene |
| Ethylbenzene |
| Tetrachloroethene |
| Toluene |
| Trichloroethene |
| Vinyl Chloride |
| Xylenes |

### 3.1.1 Groundwater Treatment

The following summarizes the groundwater treatment requirements for VDOT to utilize the Camp Allen Treatment Plant (CATP) to process and treat the groundwater from agreed upon dewatering activities for the I-564 Connector.

- Contaminated groundwater can be accepted into the CATP from only those areas inside the one-microgram per liter (ug/L) shallow VOC plume associated with the CAA areas shown on Figure 5. The dewatering operations currently identified by VDOT, in order of occurrence and length of duration, shall include:
    - Communication equipment installation near manhole CA-58 - shall not exceed a withdrawal rate of 50 gpm for no longer than six weeks.
    - Fleetrec Park Utility Installation – shall not exceed a withdrawal rate of 50 gpm for no longer than 5 months.
    - Fleetrec Park Construction – shall not exceed a withdrawal rate of 50 gpm for no longer than 6 months.
- VDOT shall submit any additional dewatering operations requiring use of the CATP to the Navy for review and approval.
- The maximum flow rate from dewatering operations shall be limited to the CATP's additional capacity of 50 gpm. It is the Navy's intention to provide treatment capability for 24 hrs/day and 7 days/week. However, should the CATP experience an outage, the Navy cannot guarantee that treatment operations will be restored within a 90-day period. In the event of an outage, VDOT must manage accumulated groundwater under Virginia Solid Waste Regulations. The Decision Document for the Camp Allen Landfill site does not specify an acceptable maximum outage. Therefore, VDOT shall be prepared to cease dewatering or address an outage via other disposal alternatives and have appropriate storage available when the Navy has an outage associated with routine

maintenance. The Navy has experienced a 98% reliability rate for the plant. Typical plant outage time associated with scheduled maintenance and power outages is outlined Appendix A.

- The groundwater from the dewatering operations shall be discharged to a water pretreatment facility that shall be constructed and operated by VDOT and located 150 feet or less to the northwest of the CATP as shown on Figure 6.
- VDOT shall install a flow meter, capable of monitoring for total flow and instantaneous flow, between the dewatering discharge pipe and the first pretreatment tank and shall monitor flow on a continuous basis. Flow rate from VDOT's dewatering shall be limited to less than 50 gpm.
- The water pretreatment facility shall be operated during all dewatering operations for the removal of suspended sediments from the extracted groundwater prior to discharge into the CATP. The facility will include settling tanks and filtration equipment, such as bagfilters, to remove the suspended sediments from the groundwater. In addition, the facility will include an equalization tank, with a minimum capacity of 5,000 gallons that will store the filtered water. The suspended sediments of the pre-treated groundwater shall not exceed 10.0 mg/L prior to discharge into the CATP.
- VDOT shall monitor the water in the equalization tank on a daily basis for suspended solids. The analysis will be done in the field within a four-hour period in accordance with an approved ASTM or EPA Method. Analytical results will be submitted to the Navy within 24 hours of sample collection.
- Navy shall install a flow control station at the VDOT discharge into the pretreatment facility to limit the flow to the 50-gpm limit. This flow control station will consist of a 1-1/2-inch magnetic flow meter, a pinch control valve, either a local flow controller or a PLC/SCADA configured flow controller, manual isolation ball valves for the flow control station, and a manual ball valve for a flow control station bypass line.
- Utilizing a submersible effluent style pump, the Navy shall pump the pretreated water from VDOT's equalization tank into the CATP.
- The water transmission system from the pretreatment system to CATP, to be installed by the Navy, shall include a pressure switch, to open a recirculation line back to the dewatering settling tank when there is a plant outage which will close the VDOT feed line (pretreatment discharge line) to the CATP.
- Treatment of the groundwater shall be completed in accordance with the Non-Significant Differences Documentation to the existing CERCLA, July 17, 1995 Decision Document for Camp Allen Landfill (CALF). The Non-Significant Differences Documentation addresses the groundwater within the CALF Shallow Volatile Organic Compound (VOC) plume (See Figures 5.).
- All non-disposable groundwater treatment and sampling equipment that comes in contact with contaminated groundwater shall be decontaminated immediately after use and prior to being removed from the site. The procedures for the decontamination of personnel and equipment shall be included in the Work Plan.

- Installation of groundwater treatment controls, monitoring, equipment, pretreatment equipment, metering, and site cleanup costs will be VDOT's responsibility.
- VDOT shall address the impacts from storm water runoff during construction activities. Contractors will be required to implement storm water management practices to minimize the impact of storm water on the CAA.

### 3.1.2 Sediment Handling

The accumulated sediments within the pretreatment facility, resulting from the dewatering operations, shall be safely managed and properly disposed of. It is VDOT's responsibility to determine the type and frequency of sampling required to be protective of human health and to determine proper disposal methods. All sampling and disposal activities must be in accordance with the appropriate regulatory requirements and the Navy's requirements. Samples of the accumulated solids are to be collected and analyzed for the methods outlined in Table 2. All activities are additionally subject to approval by the Navy, Virginia DEQ, and EPA via the review of site-specific work plans.

TABLE 2
Soil Disposal Testing Methods

| Analyte(s) | Analytical Method |
|---|---|
| TCLP | 1311/8260B,8270C,8081A,8151A,6010B/7470A |
| Ignitability | 1010, Modified 1010 |
| Reactive Cyanide/Sulfide | SW-846 Section 7 |
| Corrosivity | 9040, 9045 |

### 3.1.3 Spill Prevention

VDOT shall provide spill control measures, including secondary containment and automatic high water level shutoff controls within the pretreatment tanks, to demonstrate that there will be no surface discharges of water from either the tank or distribution lines during the dewatering operations and CATP outages. The specific spill prevention measures shall be provided by VDOT in the work plans prior to initiating dewatering operations.

### 3.1.4 Groundwater Modeling

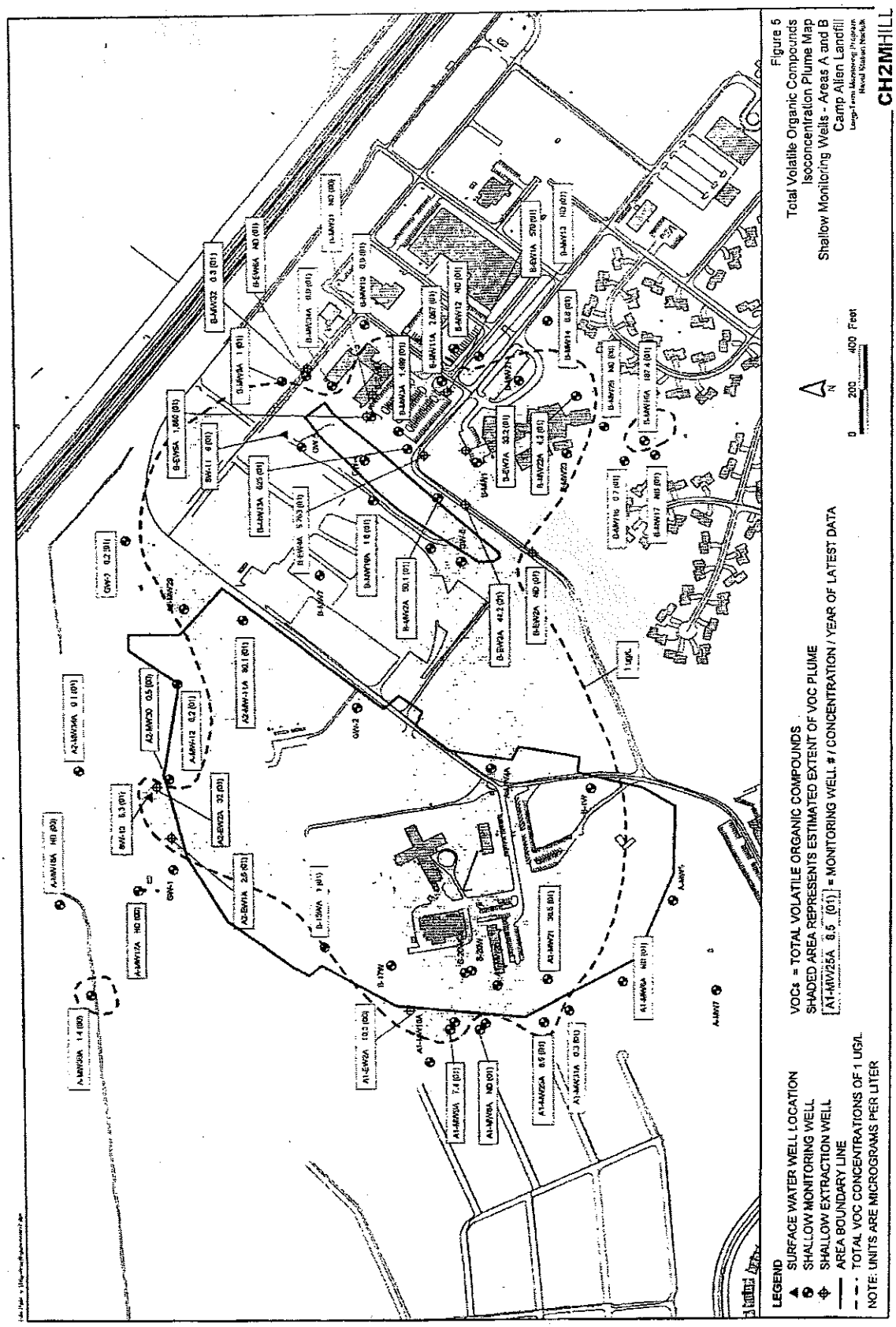
VDOT shall utilize a MODFLOW groundwater flow model to assess the impact of all dewatering operations on the existing CALF groundwater and Navy remediation system to ensure that existing capture zones (Figures 3 and 4) and VOC plume (Figures 5) are not adversely altered by construction dewatering. The data that the Navy believes is relevant to the modeling was provided to VDOT's contractor, Marshall Miller and Associates. The Navy will review VDOT's modeling results within three weeks of receipt from VDOT and advise of any dewatering scenarios considered unacceptable. Specifically, the modeling shall demonstrate the following acceptable conditions:

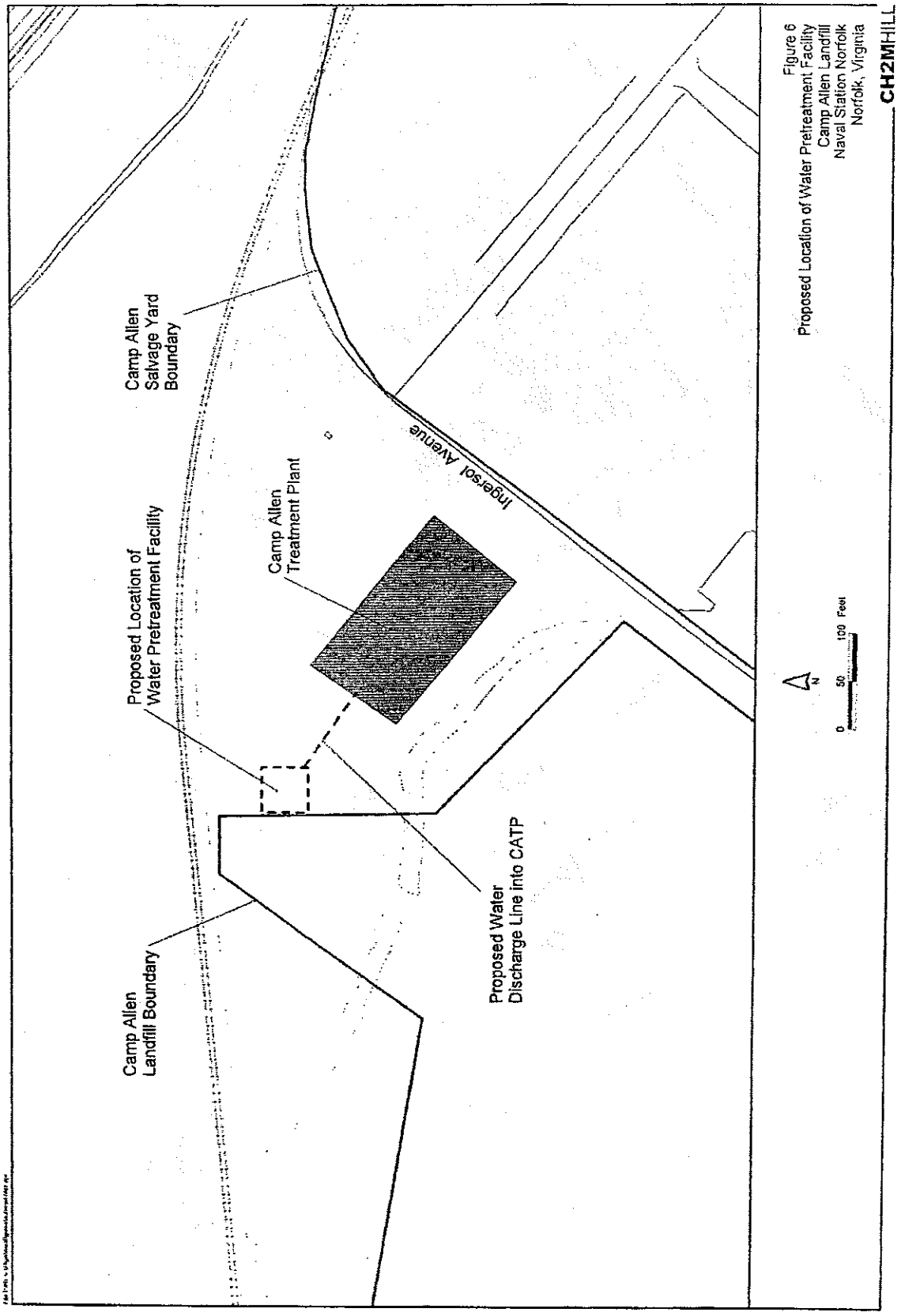
- Where the groundwater withdrawal locations are outside the shallow VOC Plume boundary (Figure 5), the capture zone of the shallow dewatering wells shall not extend across the plume boundary to expand the plume.
- Where the groundwater withdrawal location are within the shallow VOC Plume boundary (Figure 5), the capture zone of the shallow dewatering wells shall be located such that the groundwater flow direction within the capture zone is towards the center of the plume.

### 3.1.5 Groundwater Monitoring

To verify the modeling results of the dewatering operations the following groundwater monitoring is to be conducted:

- Where the groundwater dewatering locations are outside the shallow VOC Plume boundary groundwater samples shall be collected from a location between the dewatering wells and the plume boundary. Samples shall be collected before, during and after the dewatering operation and analyzed for VOCs using EPA CLP Method OLCO2. Groundwater samples are to be collected every two weeks during dewatering operations and analyzed within 48 hours of sample collection. The analytical results are to be reported to the Navy within four days of sample collection. The samples shall be collected from either existing monitoring wells or new monitoring wells (to be installed by VDOT) that are located within the shallow aquifer.
- Prior to and during dewatering operations, groundwater level measurements shall be collected by VDOT at least twice per day from at least two wells located within a 100-foot radius of the dewatering wells. The water levels shall be collected from either existing monitoring wells or new monitoring wells (to be installed by VDOT) that are located within the shallow aquifer.
- If the groundwater monitoring outside the plume demonstrates that the groundwater plume has expanded, by an increase in the VOC concentrations, VDOT shall cease the dewatering operation.


LEGEND
SURFACE WATER WELL LOCATION
SHALLOW MONITORING WELL
SHALLOW EXTRACTION WELL
AREA BOUNDARY LINE
TOTAL VOC CONCENTRATIONS OF 1 UG/L
NOTE: UNITS ARE MICROGRAMS PER LITER
VOCs = TOTAL VOLATILE ORGANIC COMPOUNDS
SHADED AREA REPRESENTS ESTIMATED EXTENT OF VOC PLUME
[A1-MW25A 8.5 (01)] = MONITORING WELL # / CONCENTRATION / YEAR OF LATEST DATA
N
0 200 400 Feet
Figure 6
Total Volatile Organic Compounds
Isoconcentration Plume Map
Shallow Monitoring Wells - Areas A and B
Camp Allen Landfill
Long-Term Monitoring Program
Naval Station Norfolk
CH2MHILL


Camp Allen
Salvage Yard
Boundary
Ingersol Avenue
Camp Allen
Treatment Plant
Proposed Location of
Water Pretreatment Facility
Camp Allen
Landfill Boundary
Proposed Water
Discharge Line into CATP
N
0
50
100 Feet
Figure 6
Proposed Location of Water Pretreatment Facility
Camp Allen Landfill
Naval Station Norfolk
Norfolk, Virginia
CH2MHILL

# 4 Navy Points of Contact

All work plans and groundwater modeling reports will be submitted to the Navy for review and approval prior to conducting any dewatering operations in the field. The documents are to be submitted to the Navy Site Manager. All field operations of the dewatering are to be coordinated with the Camp Allen Treatment Plant Operator.

# 5 References

Baker Environmental, Inc. (Baker). 1994. Final Camp Allen Landfill RI Report, Norfolk Naval Base, Norfolk, VA. Contract Task Order 0084, Contract N62470-89-D-4814.

Baker Environmental, Inc. (Baker). 1995a. Revised Final Baseline Risk Assessment, Camp Allen Landfill, Norfolk Naval Base, Norfolk, VA. Contract Task Order 0084, Contract N62470-89-D-4814.

Baker Environmental, Inc. (Baker). 1995b. Final Decision Document, Camp Allen Landfill, Naval Base Norfolk Virginia. Contract Task Order 0084, Contract N62470-89-D-4814.

Baker Environmental, Inc. (Baker). 1998. Final Engineering Evaluation/ Cost Analysis (EE/CA), Camp Allen Salvage Yard, Norfolk Naval Base. Contract Task Order 0353, Contract N62470-89-D-4814.

Baker Environmental, Inc. (Baker). 1999. Draft Remedial Investigation/Risk Assessment Report for Camp Allen Salvage Yard, Norfolk Naval Base, Norfolk, VA. Contract Task Order 0353, Contract N62470-89-D-4814.

Baker Environmental, Inc. (Baker). 2002a. Non-Significant Differences Documentation, Camp Allen Landfill Site 1, Naval Station Norfolk, Norfolk, VA. Contract Task Order 0353, Contract N62470-89-D-4814.

CH2MHILL, Inc. 2002a. 2001 Annual Long Term monitoring Report, Naval Station Norfolk, Norfolk, Virginia, Contract Task Order 0156, Contract N62470-95-D-6007.

CH2MHILL, Inc. 2002b. Technical Memorandum Construction Restrictions for Navy Property, Naval Station Norfolk, Norfolk, VA. Contract Task Order 0117, Contract N62470-95-D-6007.

APPENDIX A

# Camp Allen Treatment Plant Shut Down

**Annual O&M requires the following shutdown time:**

Process tank cleaning/inspection - 1 day for each of 3 tanks (3 total days)

Clarifier inspection/cleaning - 2 days 2x annually (4 total days)

Pipe/valve inspection/cleaning (between T-130 & clarifier) 2 days 2x annually(4 total days)

Carbon and sand cell changeout - 3 days total (unless done prior to VDOT water intro.)

**Emergency shut downs:**

The CATP averages 98 percent operational time for the plant which equates to about 1 week of unanticipated down time per year. Most of that down time is attributed to plant power supply interruptions that cause the plant to go down during unattended hours. As an example, a power interruption recently occurred during the night and the plant was re-started in the morning.

On an annual basis the CATP would typically experience three instances of unanticipated shutdown for two days each.